

Hautalampi Ore Reserves and Mineral Resources classification according to UNFC-2019 and bridging to the JORC 2012-Code

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The [draft EU Critical Raw Materials Act \(CRMA\)](#) presented by the European Commission on 16 March 2023 sets the EU strategy to ensure a secure and sustainable supply of critical raw materials. Within the CRMA the UNFC is described as the primary system for reporting and harmonization tool for European raw materials projects.

United Nations Framework Classification for Resources (UNFC) is an international scheme for sustainable resource management of classifying, managing, and reporting of e.g., energy, mineral, and raw material resources to assist regional and national authorities in establishing and maintaining an inventory of primary and secondary raw materials projects.

In 2020 Geological Survey of Finland (GTK) classified all raw materials projects in accordance with UNFC. GTK has integrated the UN's classification guidelines and structure for mineral resources ('national mineral inventories') into GTK [MDaE](#) map server. Also, for Hautalampi there is an UNFC codification for the Ore Reserves and Mineral Resources as a list form.

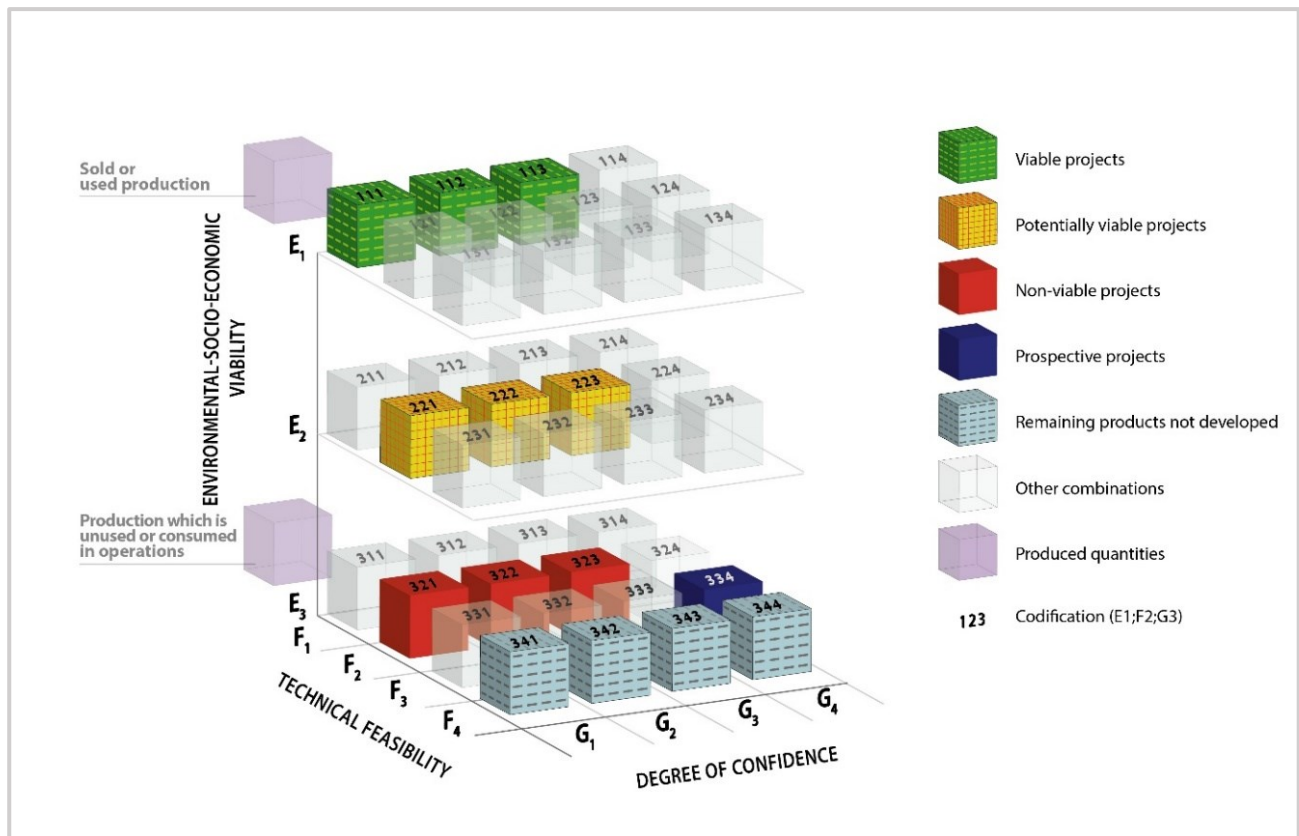


Figure 1. UNFC-2019 Classification.

The Hautalampi Project is reported in accordance with the JORC 2012-Code. In this document the current Hautalampi Ore Reserves and Mineral Resources are presented and described in more detailed way with emphasis on bridging between the UNFC and CRIRSCO International Reporting Template. The JORC Committee is a member of the Committee for Mineral Reserves International Reporting Standards (CRIRSCO) and therefore, aligned with CRIRSCO Template.

CRIRSCO Template		UNFC-2009 "minimum" Categories			UNFC-2009 Class
Mineral Reserve	Proved	E1	F1	G1	Commercial Projects
	Probable			G2	
Mineral Resource	Measured	E2	F2	G1	Potentially Commercial Projects
	Indicated			G2	
	Inferred			G3	
Exploration Results		E3	F3	G4	Exploration Projects

Figure 2. Mapping of CRIRSCO Template to UNFC-2009 Classes and Categories. Modified from the CRIRSCO-UNFC [Bridging Document](#) between The CRIRSCO Template and UNFC. Colors refer to the Hautalampi Ore Reserves and Mineral Resources in Table 1.

[UNFC](#), updated in 2019, is a principles-based system and based on three-dimensional presentation where category definitions are the building blocks of the system (Fig. 1). The categories are defined as three fundamental Criteria of environmental-socio-economic viability (E-axis), technical feasibility (F-axis), and degree of confidence (G-axis). Primary level of resource classification results from the combination of a Category from each of the three Criteria. The CRIRSCO-style reported Mineral Reserves ('Ore Reserves') and Mineral Resources can be directly mapped into UNFC following the CRIRSCO-UNFC Bridging Document (UNECE, 2015) presented in Figure 2.

In Table 1, the Hautalampi JORC 2012-Code Ore Reserves and Mineral Resources have been mapped into UNFC Categories. According to the CRIRSCO-UNFC Bridging Document the Ore Reserves go into 111 ('Proven Reserves') and 112 ('Probable Reserves') and the Mineral Resources into 221 ('Measured Resources'), 222 ('Indicated Resources') and 223 ('Inferred Resources') categories.

Table 1. Bridging between the Hautalampi JORC 2012-Code Ore Reserves and Mineral Resources and UNFC categories.

Hautalampi Ore Reserves as of 7 th March 2023 @ 30€/t NSR cut-off. Mineral Resources are inclusive of these Ore Reserves.																																									
	Tonnes	Ni%	Cu%	Co%	Ni ton	Cu ton	Co ton	UNFC-2019																																	
Proven	1 871 000	0.36	0.30	0.09	6800	5700	1600	111																																	
Probable	2 693 000	0.25	0.19	0.07	6900	5300	1900	112																																	
Total	4 564 000	0.30	0.24	0.08	13700	11000	3500																																		
Hautalampi Mineral Resources as of 29 th September 2022 @ 0.25 % NiEq cut-off.																																									
	Tonnes	Ni%	Cu%	Co%	S%	Zn%	Fe%	NiEq	CuEq	UNFC-2019																															
Measured	2 808 000	0.35	0.26	0.08	2.02	3.92	0.04	0.70	1.57	221																															
Indicated	6 523 000	0.25	0.16	0.06	3.03	4.50	0.09	0.51	1.14	222																															
Total	9 331 000	0.28	0.19	0.07	2.73	4.33	0.07	0.57	1.27																																
Hautalampi																																									
Inferred	216 000	0.21	0.12	0.02	1.91	3.79	0.07	0.32	0.72	222																															
Mökkivaara																																									
Inferred	3 188 000	0.22	0.13	0.05	2.32	4.41	0.09	0.44	0.97	223																															
For the Hautalampi Ore Reserves the Net Smelter Return (NSR) cut-off value of 30 €/t was used, based on the following economic and processing assumptions:																																									
<table border="1"> <thead> <tr> <th></th> <th>Recovery (%)</th> <th>payable (%)</th> <th>USD/t</th> </tr> </thead> <tbody> <tr> <td>Ni</td> <td>82</td> <td>70</td> <td>20 000</td> </tr> <tr> <td>Co</td> <td>82</td> <td>50</td> <td>60 000</td> </tr> <tr> <td>Cu</td> <td>86.5</td> <td>90</td> <td>9 000</td> </tr> <tr> <td colspan="4">USD/EUR = 1.00</td> </tr> </tbody> </table>					Recovery (%)	payable (%)	USD/t	Ni	82	70	20 000	Co	82	50	60 000	Cu	86.5	90	9 000	USD/EUR = 1.00				<table border="1"> <thead> <tr> <th>Costs</th> <th>€/t</th> </tr> </thead> <tbody> <tr> <td>Administration</td> <td>3.10</td> </tr> <tr> <td>Mining</td> <td>21.55</td> </tr> <tr> <td>Concentrator</td> <td>15.33</td> </tr> <tr> <td>Logistics</td> <td>0.98</td> </tr> <tr> <td></td> <td>41.16</td> </tr> </tbody> </table>						Costs	€/t	Administration	3.10	Mining	21.55	Concentrator	15.33	Logistics	0.98		41.16
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For the Hautalampi Mineral Resources the NiEq cut-off was estimated by using value calculation (NVC). Using the assumed metal prices and operating costs of 35 €/t the break-even cut-off grade was estimated to 0.25 % NiEq. The metal prices used were the same as for the Ore Reserve calculation.																																									

References

United Nations Framework Classification for Resources – Update 2019. Available at

https://unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/publ/UNFC_ES61_Update_2019.pdf

UNECE, 2021. Supplementary Specifications for the Application of UNFC to Minerals. Available at

<https://unece.org/sites/default/files/2022-01/UNFC%20Mineral%20Specifications%202021.pdf>

UNECE, 2015. Revised Bridging Document Between the CRIRSCO Template and UNFC-2009 (1 May 2015).

Available at

https://unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/UNFC_specs/Revised_CRIRSCO_Template_UNFC_Bridging_Document.pdf

Geological Survey of Finland, Mineral Deposits and Exploration website (MDaE), available at

<https://gtkdata.gtk.fi/mdae/index.html#>

PFS Study for Hautalampi Ni-, Cu-, Co-Deposit, Outokumpu, Finland, Effective date: 7th March 2023. AFRY.

Available at <https://mb.cision.com/Public/12124/3736415/a680bdd6214521a4.pdf>

Disclaimer

The document is to demonstrate UNFC codification for the Hautalampi Mineral Property for the purpose of reporting aggregated information from mineral inventory databases to support national mineral inventories, information management and policy decisions.

FinnCobalt Oy is not responsible of any misuse of information presented in this document. UNFC codification is not JORC-compliant, and the company has no intentions to use UNFC codification as part of the company's public disclosure for regulatory purposes and investment decisions.

No Resources and Reserves have been modified or altered. All background information used in the conversion presented in this document has been published in the company's PFS Study (FinnCobalt 2023). The bridging was done in accordance with the UNFC-CRIRSCO Bridging Document (UNECE, 2015).